DRAFT Work Plan

Cleanup Action Program
North Boeing Field Fire Training Center
King County Airport
Seattle, Washington

December 2, 1992

Prepared for

Boeing Corporate Environmental Affairs
Seattle, WA

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TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

This document presents a Work Plan which describes a cleanup action program to be conducted at the North Boeing Field Fire Training Center. The program is being conducted as an independent cleanup action under the Model Toxics Control Act (MTCA) Cleanup Regulation (WAC 173-340). Key elements of the program will include excavation of up to an estimated 4,000 yd^3 of soil containing petroleum hydrocarbons from two separate areas, removal of a 500-gallon underground storage tank (UST), follow-up soil sampling to assess and document cleanup actions, management of decontamination water and surface water/groundwater during the construction period, site restoration, and soil treatment and/or disposal. It is anticipated that cleanup activities will be performed during the dryer summer months, likely in 1993.

This work plan has been developed to describe the above-mentioned items and other related tasks associated with the cleanup activities. The full project scope and detailed design are as yet not fully defined; therefore, this work plan has been developed to address tasks through soil excavation.

The tasks described in this work plan will be performed in accordance with appropriate regulations, procedures, and permitting requirements regarding UST removal; soil remediation; material transportation; treatment and disposal of materials containing petroleum hydrocarbons; and occupational health and safety as promulgated by the appropriate local, state, and federal agencies. These regulations include, but are not limited to, the Model Toxics Control Act (MTCA [WAC 173-340]); Washington State's Underground Storage Tank regulations (WAC 173-360); the Guidance for Remediation of Releases From Underground Storage Tanks (Washington State Department of Ecology [Ecology] 1991); Excavation and Shoring (WAC 296-155), and Confined Spaces (WAC 296-62).

Appendix A provides general quality assurance/quality control (QA/QC) protocols for field sampling. The project Health and Safety Plan is included as Appendix B of this Work Plan.

2.0 BACKGROUND

2.1 SITE DESCRIPTION

The North Boeing Field Training Center is located approximately 1,000 ft northwest of the north end of the King County Airport main runway. An inactive power plant previously operated by Seattle City Light is located about 200 ft to the northwest. A vicinity map is presented on Figure 1. The site location relative to surrounding features is shown on Figure 2.

The North Boeing Field Training Center consists of a rectangular-shaped earthen impoundment measuring approximately 100 ft by 140 ft. The impoundment is divided into two cells by an earthen dike. The larger southern cell is approximately three times the area of the smaller northern cell. The bottom of the cells are at the approximate elevation of surrounding grades and the berms surrounding the cells are generally 2-3 ft above grade. Both cells are unpaved and uncovered.

Also present near the impoundment is a 500-gal underground storage tank (Tank BF-26). The tank was used for the storage of jet fuel for the fire training exercises. One other nearby feature includes an approximate ¼-acre geotextile-covered area and drainage ditch. Underlying the geotextile are one concrete and one wood catchment basins which were apparently part of a drainage system for the impoundments (Shannon & Wilson 1983; CH2M Hill 1987). These features are shown on the Site Map, Figure 3.

According to informal interviews with King County Airport personnel, the North Boeing Field Fire Training Center was last used for fire training exercises during the winter of 1991/92. Apparently the fire training exercises were conducted (in the most recent past) by filling the southern cell of the impoundment with water and placing a floating layer of flammable liquid (jet fuel) on top of the ponded water. Gasoline torches were then used to set the liquid aflame and the fire was subsequently extinguished with water and/or foam. Because the predominant wind direction in the area is southwesterly, the fire trucks and personnel usually were staged at the southern end of the impoundment allowing the exercise to be conducted from the upwind direction. The smaller northern cell functioned to retain spill-over generated from the high pressure water hoses used to extinguish the fire.

2.2 PREVIOUS INVESTIGATIONS

Since 1983, there have been several soil and groundwater investigations conducted at the North Boeing Field Fire Training Center. The results of these investigations are summarized below and presented in detail in a Soil and Groundwater Investigation Report (Landau Associates 1992). During these investigations, jet-fuel range petroleum hydrocarbons at concentrations above the MTCA cleanup level of 200 mg/kg were observed in surface and subsurface soil within the areal extent of the bermed cells (and also possibly extending into a small area to the northwest of the impoundment) and in the vicinity of the two catchment basins.

Within the bermed cells, indications of petroleum hydrocarbons were generally greatest in surface soil for the south cell and in subsurface soil at depths between 1 and 4.5 ft for the north cell. In the vicinity of the two catchment basins, indications of petroleum hydrocarbons were generally greatest in subsurface soil at depths between 5 and 6.5 ft. The approximate area for which field observations of petroleum hydrocarbons were made is shown in plan view on Figure 4 and in cross section on Figure 5. The estimated volume of petroleum hydrocarbon-impacted soil (above the 200 mg/kg level) under the impoundments is up to 3,500 yd^3 (in place). For the purpose of this work plan, the volume of hydrocarbon-impacted soil at the catchment basins has been estimated at 500 yd^3 (in place), although the actual volume could be more or less.

Various volatile organic compounds, semi-volatile organic compounds, metals, and PCBs were detected in certain soil and/or groundwater samples, but at concentrations below MTCA cleanup levels. Xylene and Skydrol™ (a registered trademark for a series of fire-resistant aircraft hydraulic fluids) were detected in a limited number of soil samples at concentrations slightly above MTCA cleanup/screening levels; however, soil samples that exceeded MTCA cleanup/screening levels for these constituents were located within areas of observed petroleum hydrocarbons.

Arsenic was detected in certain groundwater samples at concentrations slightly above MTCA site cleanup levels. However, arsenic was only detected in wells which were up-gradient or cross-gradient from the impoundments and, based on: 1) the low concentrations detected, and 2) the pattern of distribution, the occurrence of arsenic above cleanup levels appear to be more reflective of natural conditions (or of background concentrations in an industrialized area), than attributable to a release from the site. Arsenic was detected in only one soil sample [B13(5.5-

6.0)], at a concentration of 10 mg/kg. Based on the above, arsenic will not be considered further during this cleanup action.

2.3 GEOLOGY AND HYDROGEOLOGY

Pertinent geological and hydrogeological information is summarized below. A detailed description of the site geology and hydrogeology can be found in the Soil and Groundwater Investigation Report (Landau Associates 1992).

The North Boeing Field Fire Training Center is located in the Duwamish River Valley, partially atop a former meander of the river which was filled with hydraulically dredged sand (from a river channelization project completed between 1917 and 1919) and other fill, including natural and manmade materials (i.e., ash from burning of coal). A geologic cross section for the site showing these units is presented on Figure 5. The location of the cross section is shown on Figure 4.

Regional studies (Landau Associates 1988) indicate a relatively flat groundwater gradient across the North Boeing Field/King County Airport facilities, with a dominantly westward gradient towards the Duwamish Waterway. Figure 6 shows estimated groundwater elevation contours at the site based on July 1992 data. Depth to groundwater is generally 6.5 to 10 ft below the present ground surface. The groundwater gradient calculated from the July 1992 data is 0.008, or about 40 ft/mi.

3.0 WORK PLAN TASKS

This section of the Work Plan describes the primary cleanup action tasks for the North Boeing Field Fire Training Center. All remedial activities in the vicinity of the fire training area will comply with the health and safety requirements of the project Health and Safety Plan (Appendix B). Close contact will be maintained between Boeing's Field Coordinator and the Airport Manager to minimize the impact of site construction activities on airport operations.

3.1 MONITORING WELL ABANDONMENT

Four monitoring wells were installed at the site in 1987 to monitor groundwater quality. These wells will be abandoned prior to excavation work. Abandonment of these wells will be performed in accordance with procedures established in State of Washington regulations (WAC 173-160-415 and 560).

3.2 EROSION CONTROL AND SITE PREPARATION

Prior to the commencement of cleanup activities, the site will be prepared by: 1) installing erosion control measures, 2) preparing a site decontamination station, and 3) developing a temporary soil stockpile area. The site layout map is shown on Figure 7. The following discusses each of these site preparation activities.

- Temporary erosion control will consist of placement of a fabric silt control fencing, as needed, to prevent soil and water with a high content of suspended solids from entering nearby catch basins. Hay bails will be placed at catchment basins and along ditches on an as-needed basis. The erosion control measures will be installed prior to commencing excavation activities. The cleanup is planned for the dryer summer months, thus minimizing the potential for erosion and runoff.
- A site decontamination station will be constructed at the start of the project. All personnel and equipment coming in contact with contaminated soil and/or groundwater will be decontaminated prior to leaving the site in accordance with the site Health and Safety Plan (Appendix B).
- A temporary soil stockpile area will be located near the excavations. A containment system will be constructed to minimize excess water entering into or out of the stockpiled area. This containment system will be bermed and lined with an impermeable liner. If necessary, a pump will be used periodically to drain the bermed area of excess water. The soil stockpiles will be covered, if necessary, with plastic sheeting.

All equipment, with the exception of the excavator, will be stored at a nearby staging area when site excavation activities are not occurring. The excavator will be stored at an approved location immediately adjacent to the excavations.

DRAFT Work Plan

Cleanup Action Program
North Boeing Field Fire Training Center
King County Airport
Seattle, Washington

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TPH - Total Petroleum Hydrocarbons

Model Toxics Control Act

3.3 SOIL EXCAVATION AND STOCKPILING

Soil containing concentrations of TPH above the MTCA cleanup level of 200 mg/kg will be excavated from two areas: the bermed cells of the fire training area and in the vicinity of the two catchment basins. The anticipated excavations measure approximately 100 x 150 ft for the bermed cells and 30 ft x 50 ft in the vicinity of the two catchment basins, as shown on Figure 4. The planned maximum depth at both excavations is approximately 8 ft. The estimated volume of soil to be excavated is up to 4,000 yd^3 (in place). The actual volume of soil removed will be determined by the limits of the soil containing TPH above the cleanup level, with the final limits of each excavation based on the results of field screening and laboratory chemical testing.

Soil samples which exceeded MTCA cleanup/screening levels for xylenes and Skydrol™ also exceeded the MTCA cleanup level for TPH. As a result, excavation of soil containing exceedances of TPH will also remove soil containing exceedances of xylenes and Skydrol™.

Following chemical testing, if an individual base or sidewall soil sample has a TPH concentration greater than 200 mg/kg, additional soil will be removed from that area. This process will continue until sample results are below the 200 mg/kg level. If an individual bottom sample exceeds the 200 mg/kg cleanup level, a case-by-case evaluation will be made to determine if deeper excavation is feasible, based on factors such as weather conditions and groundwater inflow.

The two catchment basins in the geotextile lined area will be removed as part of this cleanup action. Piping connected to the catch basins will also to removed to the extent feasible (i.e. to the nearest outlet or manhole). Following removal, catchment basin and pipe materials will be kept segregated from excavated soil. Soil stockpiling and sampling/testing at the catchment basins will be done as noted above.

All excavating will be accomplished from outside the excavations using track- or rubber-tire mounted excavating equipment. Excavated soil will be hauled to the stockpile area by a wheel-loader or in dump trucks. At the present time, it is anticipated that either one loader or two dump trucks will be used for transport between the excavation zones and soil stockpile area.

The excavation sidewalls will be excavated to the maximum inclinations permitted by site soil. Due to the presence of loose sand and fill, this may not be steeper than a slope of 1:1 (H:V) in some areas. To the extent possible, clean soil from the excavation sidewalls removed to maintain stable sideslopes will be kept segregated from soil containing hydrocarbons. Clean soil will be stockpiled for later use as backfill material at the site.

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The excavation sidewalls will be excavated to the maximum inclinations permitted by site soil. Due to the presence of loose sand and fill, this may not be steeper than a slope of 1:1 (H:V) in some areas. To the extent possible, clean soil from the excavation sidewalls removed to maintain stable sideslopes will be kept segregated from soil containing hydrocarbons. Clean soil will be stockpiled for later use as backfill material at the site.

Access to the excavations will be limited to monitoring personnel conducting field screening and soil sampling. If conditions require personnel to work at or near the base of excavation sidewalls, the sidewalls will be shored or sloped in accordance with appropriate safety regulations.

Dust may be generated by site cleanup activities. If necessary, dust emissions will be minimized by the spraying of water into the excavations and excavator bucket, and by watering of the general area and haul roads. Water will be applied with care to prevent ponding and avoid saturated soil conditions.

At the present time, it is undecided if the soil will be treated onsite, or treated/disposed offsite. If onsite treatment is selected, it is anticipated that the cleaned soil would be reused as backfill.

3.4 UNDERGROUND STORAGE TANK REMOVAL

Present near the impoundment is a 500-gal underground storage tank (Tank BF-26) previously used to store jet fuel for the fire training exercises. As part of the cleanup of the North Boeing Field Fire Training Center, this tank will be removed and disposed of in accordance with applicable federal, state, and local regulations.

The excavation bottom and sidewalls, and soil excavated from around the tank, will be inspected for visual evidence of impacts from a release. Soil samples will be collected from the excavation sidewalls and bottom for laboratory chemical testing. If present, soil containing concentrations of TPH above the MTCA cleanup level of 200 mg/kg will be excavated and transported/stockpiled as noted in Section 3.3.

3.5 MONITORING, SAMPLING, AND TESTING

As previously stated, sampling and testing of excavation bases/sidewalls will be performed to define the limits of the excavations and to document that soil with TPH concentrations above the cleanup level has been removed. Soil samples of the excavations' bases and sidewalls will be collected with the aid of a backhoe. One soil sample will be collected for about every 40-ft length of final sidewall excavation. Approximately 6 bottom samples will be collected from the bermed containment area and four from the base of the catchment basin excavation. Sampling within the excavation for the UST will be in accordance with Ecology guidelines (Ecology 1991b). Collected samples will be analyzed for TPH by Ecology Method

WTPH-D, using kerosene or JP-5 as a standard. Selected samples will also be analyzed for Skydrol™ and PCBs.

Field and laboratory procedures and quality assurance programs used for soil sampling will be conducted in accordance with the North Boeing Field Fire Training Center Site Characterization Study Work Plan (Landau Associates 1992) and Appendix A of this report. Field screening for hydrocarbon compounds will be conducted using freshly exposed soil within the excavation zones. Field screening methods will include visual observation, odor detection, and detection of organic vapors using either a flame ionization detector (FID; Foxboro or equivalent), a photoionization detector (PID; TIP/OVM meter), or a HORIBA OCMA-220 oil content analyzer. Ultraviolet fluorescence and/or hydrophobic dye may also be used if field conditions indicate their use would be appropriate.

3.6 WATER MANAGEMENT

Water management includes collection and disposal of wastewater generated by equipment and personnel decontamination, and possibly water from precipitation and inflowing groundwater. Water management also includes practices used to minimize the quantity of water generated.

Equipment and personnel decontamination practices are described in the Health and Safety Plan (Appendix B). Wastewater from decontamination activities will be stored in drums or a portable tank until disposal.

Surface water run-on into the excavations or soil stockpiles from precipitation events will be minimized by constructing a temporary soil berm around portions of the excavation areas and stockpile. However, some precipitation may still be intercepted and require removal. Excess water will be removed using sump pumps and stored in a portable tank.

Depending on the final depths of excavation, groundwater may be encountered. If inflow is limited, the water will be pumped to a portable tank and excavation will continue. Excavation(s) will be terminated in areas of rapid groundwater inflow.

Water from the cleanup action (decontamination, dewatering, etc.) will be sampled and analyzed for TPH and other compounds prior to disposal. Results will be compared to Boeing's Metro discharge limits. If water quality is acceptable, the water will be discharged to the sanitary sewer system. If the water quality is not acceptable for release to Metro, the water will be disposed of offsite in accordance with applicable regulations.

3.7 EXCAVATION BACKFILLING AND SITE RESTORATION

Following completion of excavation activities, excavated areas will be backfilled and revegetated. Any roadways or utilities altered by the excavations will be restored. The two catchment basins, however, will not be replaced.

Backfill will be placed in lifts of about 2 ft, and will be compacted to be compatible with the surrounding soil density. A thin lift of topsoil will be placed at the ground surface. The site grades will be compatible with the surrounding land surface and the topsoil layer will be seeded with winter grass.

3.8 FINAL SOIL AND CATCHMENT BASIN DISPOSITION

Excavated soil will be either treated onsite using a thermal desorption unit, treated offsite at a commercial thermal desorption unit, or disposed of at an approved landfill. The soil stockpile area will be cleaned and returned to its original condition upon completion of the project. The catchment basins and any associated removed piping will be either: 1) cleaned and recycled, or 2) transported offsite to an approved landfill.

4.0 REPORTING

Following the cleanup action, a summary report will be prepared. The report will include a description of the extent of the excavations, a description of the soil sampling program (including sample locations), a summary of laboratory chemical testing results, a brief evaluation of site conditions following cleanup action, and supporting documentation.

5.0 REFERENCES

CH2M Hill Northwest. 1987. *"Soil and Groundwater Investigation, North Boeing Field Fire Drill Pit."* Report to the Boeing Commercial Airplane Company, Renton Division-Environmental Engineering. December 1987.

Ecology. 1991a. Model Toxics Control Act Regulation, Chapter 173-340 WAC, Effective February 28, 1991.

Ecology. 1991b. Guidance for Remediation of Releases from Underground Storage Tanks. July.

Ecology. 1992. Model Toxics Control Act Human Health Risk Based Method C Formula Value, Washington State Department of Ecology, Toxics Cleanup Program. January 2, 1992, Draft Version.

Landau Associates, Inc. 1988. Preliminary Summary of Soil and Groundwater Information, North Boeing Field Facility, Seattle, Washington. Prepared for Boeing Commercial Airplanes. March.

Landau Associates, Inc. 1990. Draft Work Plan, Site Characterization Study, North Boeing Field Fire Training Center, King County Airport, Seattle, Washington. Prepared for Boeing Corporate Environmental Affairs, March 29, 1992.

Landau Associates, Inc. 1992. Report, Soil and Groundwater Investigation, Fire Training Center - North Boeing Field, King County Airport, Seattle, Washington. Prepared for Boeing Corporate Environmental Affairs, October 26, 1992.

Laucks Testing Laboratories, Inc. 1984. Laboratory Report No. 84718 to the Boeing Company, attention Mr. Kirk Thompson.

Shannon & Wilson. 1983. *"Subsurface Investigation of Petroleum Product Occurrence, North Boeing Field Practice Pit."* Letter report to the Boeing Company, attention Mr. Ed Loughrey. July 12, 1983.

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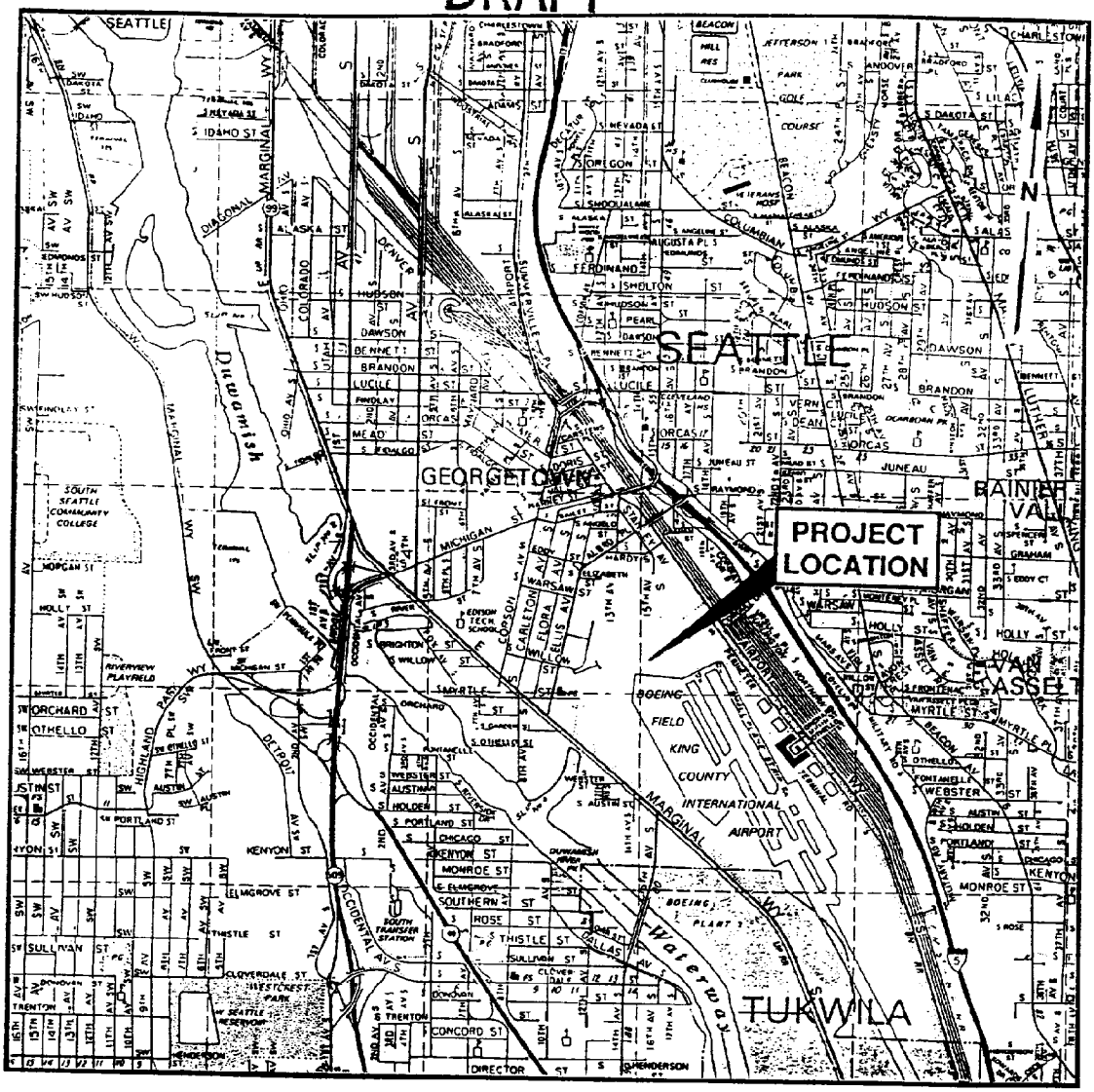

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Vicinity Map | Figure 1

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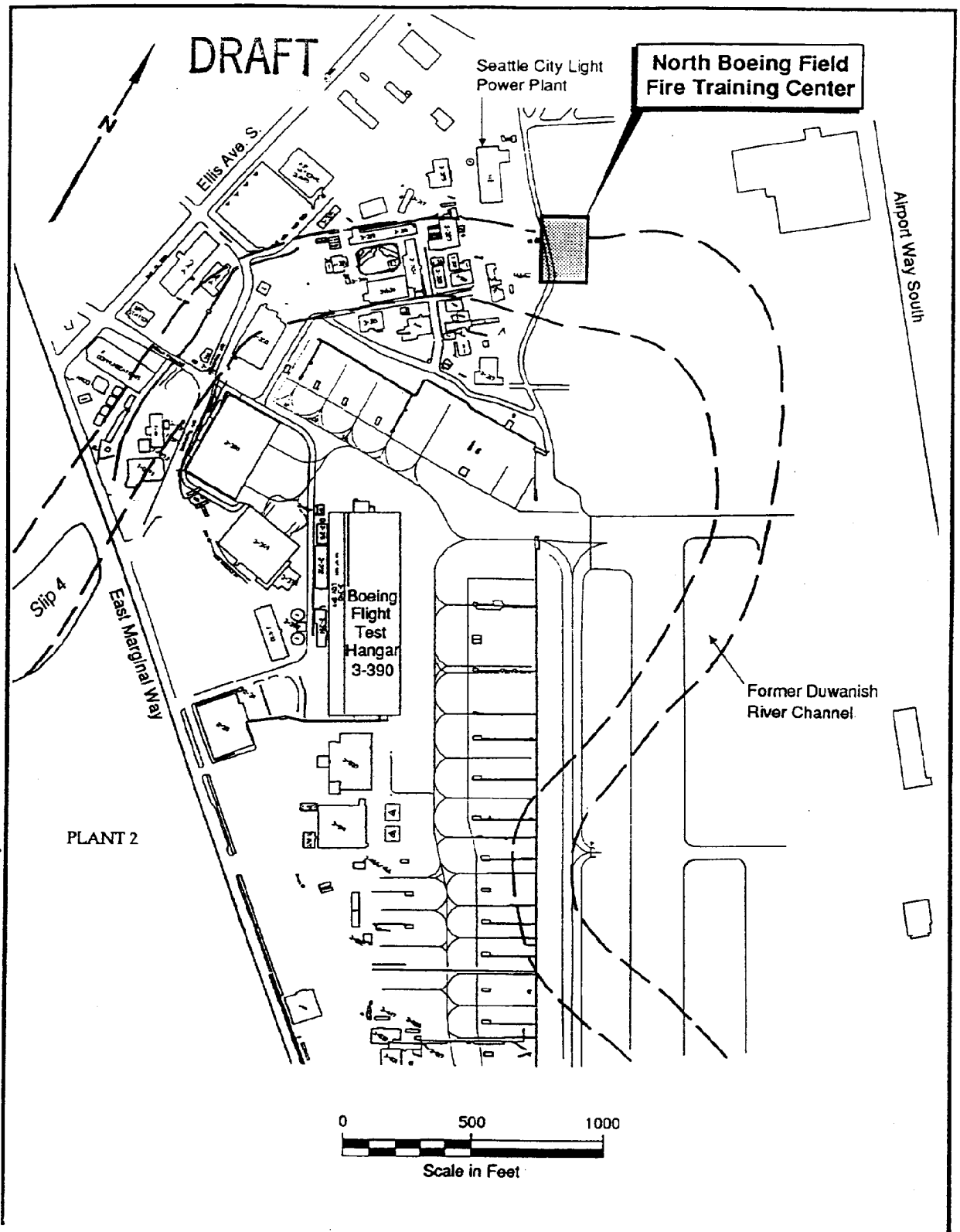

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North Boeing Field Training Center
Location Map

Figure 2

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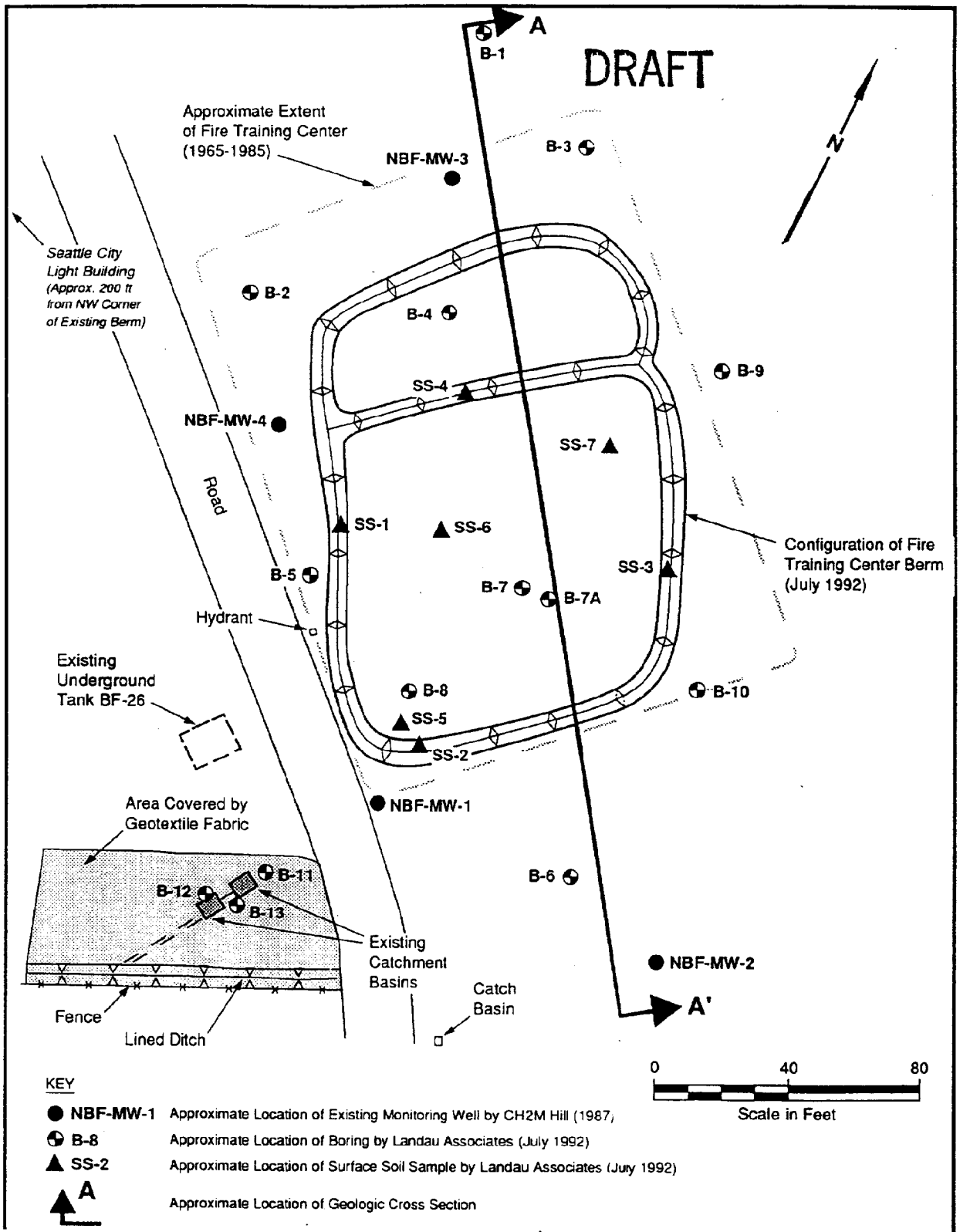

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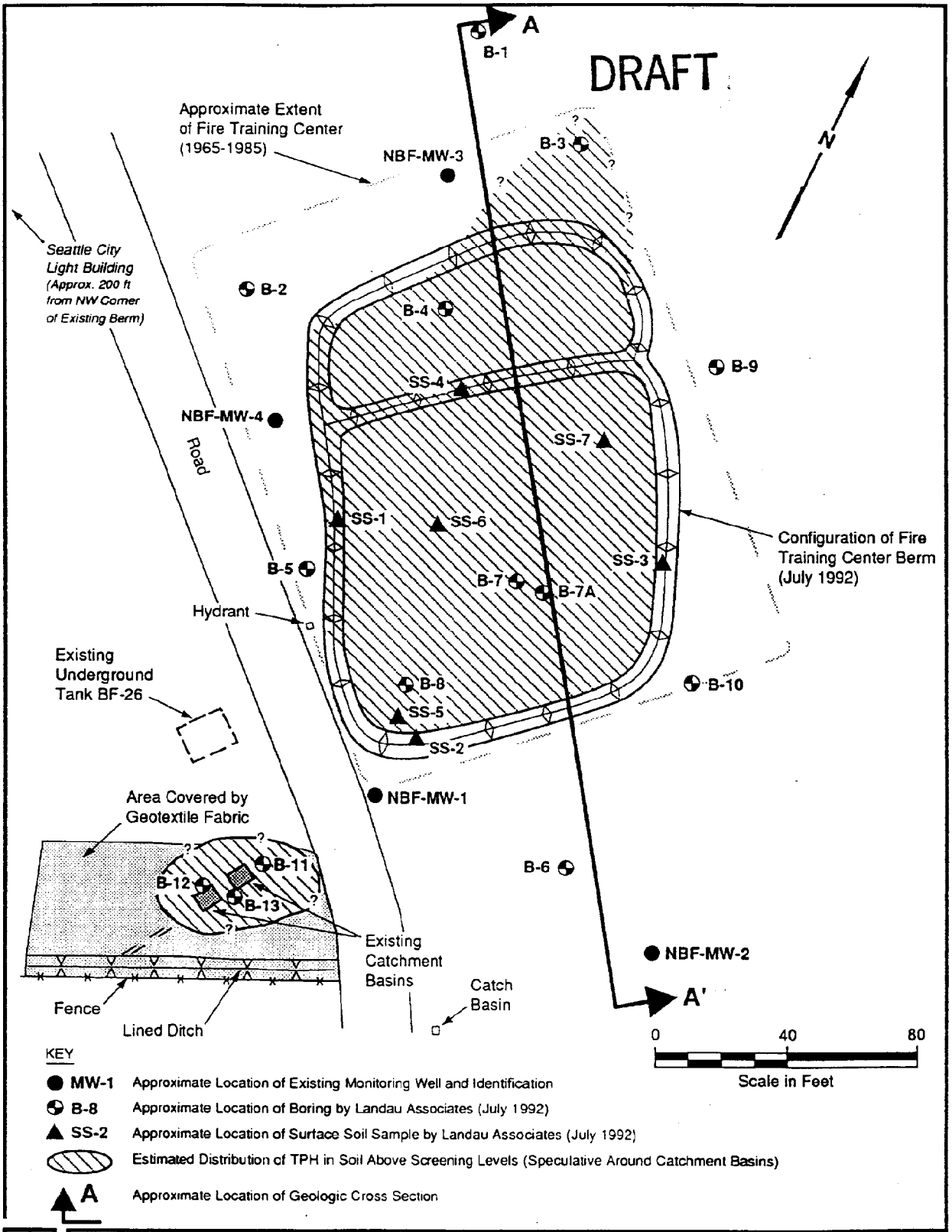
Site Map | Figure 3



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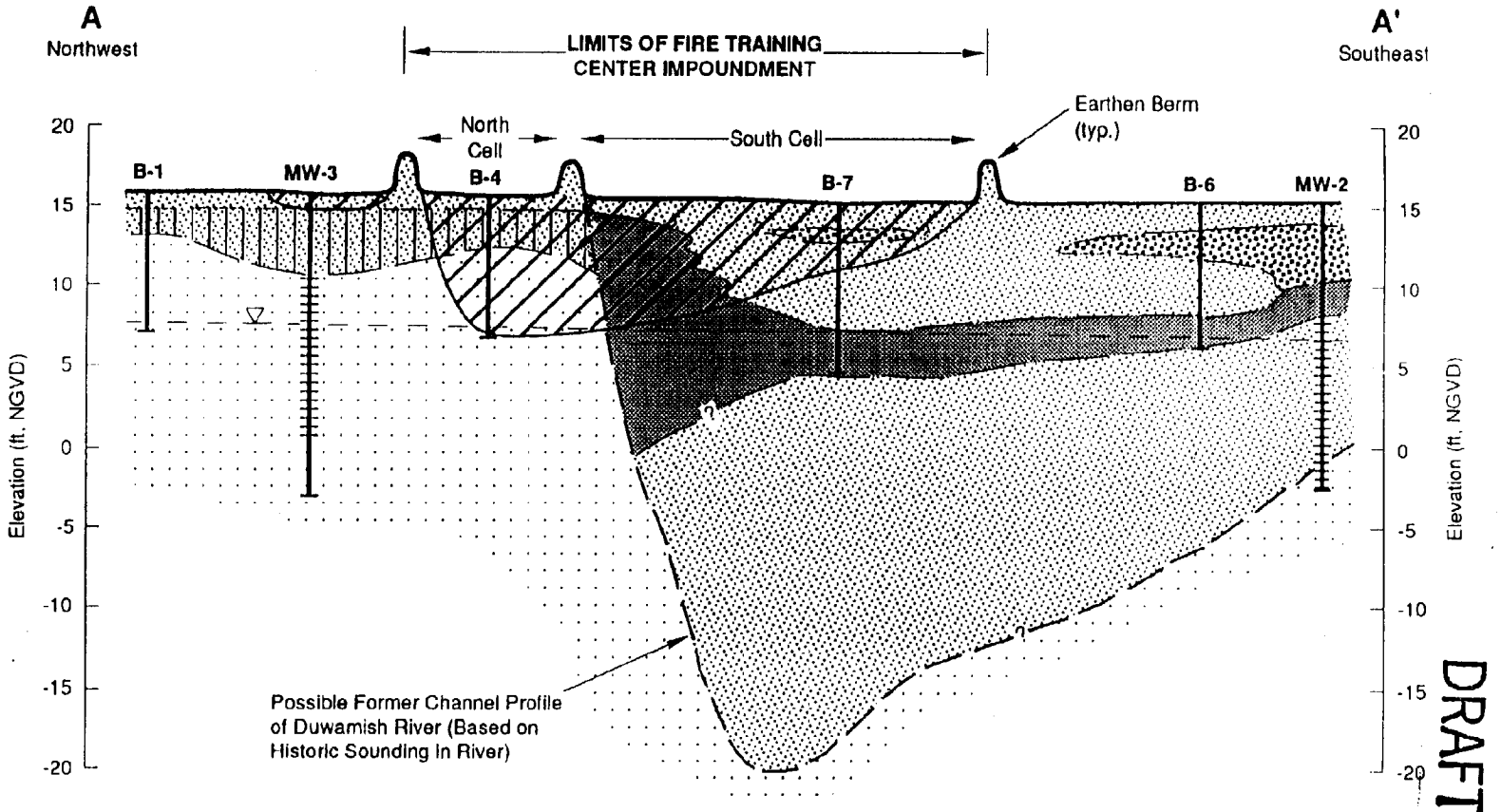
Plan View Showing Estimated Horizontal Distribution of TPH in Soil Above Screening Level

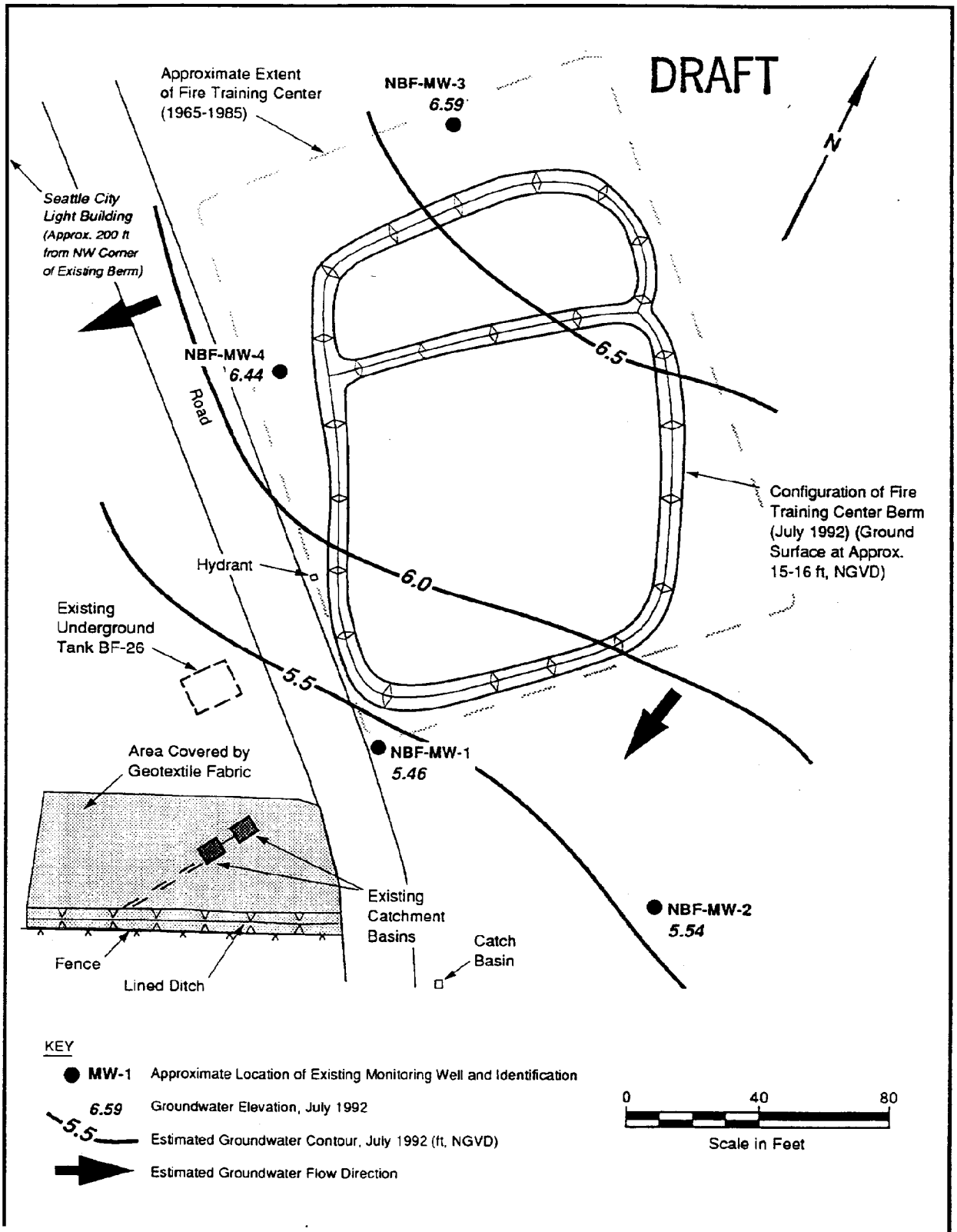
Figure 4



Notes:
1. Refer to the text of this report for proper understanding of subsurface conditions.
2. Prefix "NBF-" on well identifiers has been omitted for brevity.

Cross Section Showing Estimated Vertical Distribution of TPH in Soil Above Screeing Levels

Figure 5



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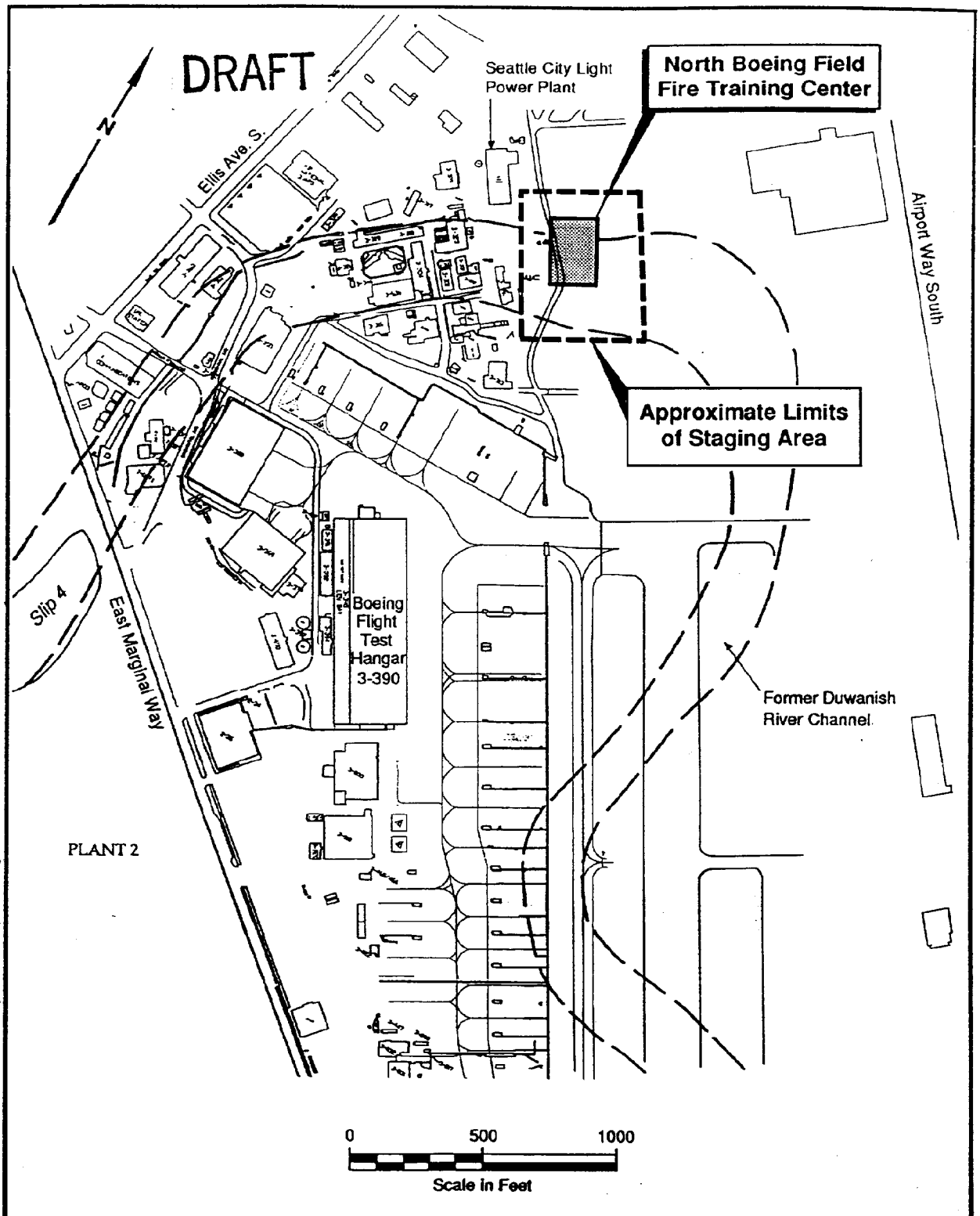
Estimated Groundwater Contours, July 1992 | Figure 6



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Site Layout Map | Figure 7

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APPENDIX A

Quality Assurance Plan

APPENDIX A
QUALITY ASSURANCE PLAN

This Quality Assurance Plan establishes quality assurance procedures for the cleanup action program. The objective of quality assurance is to demonstrate that laboratory results from analysis of soil and water samples are representative of actual site conditions. The overall goal of the Quality Assurance Plan is to provide a reasonable degree of confidence in the project data and results through the establishment of a rigorous system of quality and performance checks on sample collection, analysis, and reporting.

SAMPLE COLLECTION PROCEDURES

Sampling locations for samples collected from the excavation sidewalls for chemical testing will be determined by field screening. A series of samples will be collected for field screening using a shovel or the excavator bucket. The locations with the highest field screening readings will then be sampled for laboratory chemical testing by collecting soil from a small hole dug adjacent to the holes dug for field screening, or by collecting soil from the excavator bucket. Sample jars will be filled using a stainless-steel spoon. Samples from the bottom of the excavations will be collected in a similar manner as from the excavation sidewalls, except field screening will not be used to determine sample locations. Instead, samples were collected based on obtaining representative aerial coverage of the excavation bottom.

All sampling equipment will be decontaminated between samples by scrubbing with a solution of surfactant and tap water, followed by a tap water rinse, and a final distilled water rinse. Equipment will be air dried and kept in plastic bags between use.

SAMPLE HANDLING PROCEDURES

Soil samples collected for chemical analysis will be documented on the Sample Collection Form (Figure A-1). Sample bottles will be obtained new or precleaned from the laboratory performing the analysis. Each sample will be labeled and sealed immediately after collection. Labels will be filled out in ink and firmly affixed to the sample containers. The sample label will contain the following information:

- Sample name
- Date and time of collection
- Project name
- Name of sampler.

In addition, the following sample handling procedures will be followed:

- As few persons as possible will handle samples.
- The sample collector will be personally responsible for the completion of the chain-of-custody record and the care and custody of samples collected until they are transferred to another person, or dispatched properly under chain-of-custody rules.
- Samples will be placed in iced coolers following collection; iced coolers will be kept in a secure area at all times.

Samples will be transferred, under chain of custody, to the laboratory within 24 hours of sample collection. The person relinquishing the samples will sign the Chain-of-Custody Form and record the date and time of transfer. A designated sample custodian at the laboratory will accept custody of the samples and certify that the sample identification numbers match those on the Chain-of-Custody Record.

FIELD QUALITY CONTROL SAMPLES

The following quality control samples will be collected to verify accuracy and precision of analytical results from this investigation:

- Field Duplicates - field duplicates for soil will consist of homogenized material split into two parts and placed into two separate sample jars. The samples will be coded such that the laboratory cannot discern from the sample label that the samples are duplicates.
- Rinsate Blanks - field rinsate blanks will consist of deionized water passed over decontaminated equipment used to collect soil samples.

LABORATORY ANALYSIS AND DATA VALIDATION

Samples will be analyzed in accordance with accepted analytical procedures, which are selected from published Ecology (Ecology 1991) and EPA methods (EPA 1986, updated 1990). Instances may arise where high sample concentrations, nonhomogeneous samples, or matrix interferences preclude achieving the desired detection limit goals and associated quality control

criteria. In such instances, the laboratory will report the reason(s) for deviations from these detection limits or noncompliance with quality control criteria.

Data validation for laboratory results will be performed according to EPA Functional Guidelines for data validation (EPA 1988). This includes evaluation of the following:

- Chain-of-Custody records
- Calibration and instrument performance
- Holding times
- Field rinsate blanks
- Blind field duplicates
- Laboratory matrix spikes
- Laboratory matrix spike duplicates
- Method blanks
- Representativeness
- Surrogate recoveries
- Comparability
- Detection limits
- Assessment of precision
- Assessment of accuracy
- Assessment of completeness.

If appropriate, data quality "flags" will be added.

REFERENCES

Ecology. 1991. Washington State Department of Ecology, Guidance for Remediation of Releases from Underground Storage Tanks. July.

U.S. Environmental Protection Agency (EPA). 1986. Test Methods for Evaluating Solid Waste (SW 846), 3rd Edition, updated 1990.

U.S. Environmental Protection Agency (EPA). 1988. Laboratory Data Validation. Functional Guidelines for Evaluating Inorganics Analysis, Hazardous Site Evaluation Division.

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Project _____
Project No. _____
Collector _____

Sample Collection Form

PURGE DATA

Well Condition: Secure (☐ Yes / ☐ No); Describe Damage _____

Depth to Water (from top of well casing) _____
Begin Purge (mo/dy/yr) _____
End Purge (mo/dy/yr) _____
One Casing Volume (gal) _____
Gallons Purged _____
Well Casing Type/Diameter _____
(remove 3 well volumes or until pH/conductivity stabilize)

Volume of Schedule 40 PVC Pipe

Diameter	O.D.	I.D.	Volume Gal/Linear Ft.	Weight of Water Lbs/Lineal Ft.
1 1/4"	1.660"	1.380"	0.08	0.64
2"	2.375"	2.067"	0.17	1.45
3"	3.500"	3.068"	0.38	3.20
4"	4.500"	4.026"	0.66	5.51
6"	6.625"	6.065"	1.5	12.5

Time	Vol. Purged	pH	Conductivity	Temperature	Comments/Observations

Purge Water Disposal to _____

SAMPLING DATA

Sample No. _____ Date Collected (mo/dy/yr) _____
Sample Location & Depth _____ Time Collected _____ AM PM
Sample Type (Soil, Ground Water, Other) _____ Weather _____
Sample Collected with ☐ Bailer ☐ Pump ☐ Split Barrel ☐ Other _____
Made of ☐ Stainless Steel ☐ PVC ☐ Teflon ☐ Other _____
Sampler Decon Procedure _____
Sample Description (Color, Texture, Density, Moisture, Turbidity, Etc.) _____

FIELD PARAMETERS

Replicate	pH	Conductivity (µS)	Temperature (°F / °C)
1			
2			
3			
4			

Meters Used for Measurement: pH _____ Conductivity _____
Conductivity: Range _____, ATC ☐ On ☐ Off
pH 7: Reads _____ @ _____ °C

ADDITIONAL INFORMATION

Sample Composited Over Time, Distance _____
Quantity, Types of Sample Containers _____
Duplicate Sample Number(s) _____
Comments: (Why Analyze, Calculations, Etc.) _____

Signature _____ Date _____ **Check if additional information on back** ☐

3/90

KCSlip4 38193

SEA404723

APPENDIX B

Health and Safety Plan

KCSlip4 38194

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This plan presents health and safety requirements for cleanup action at the North Boeing Field Fire Training Center (NBF FTC) in Seattle, Washington. The plan presents a description of existing site conditions and organization, safety rules and procedures, criteria for hazard and risk analysis, description of levels of personal protection and required equipment, air monitoring procedures, emergency response information, and requirements pertaining to training and medical monitoring of onsite personnel.

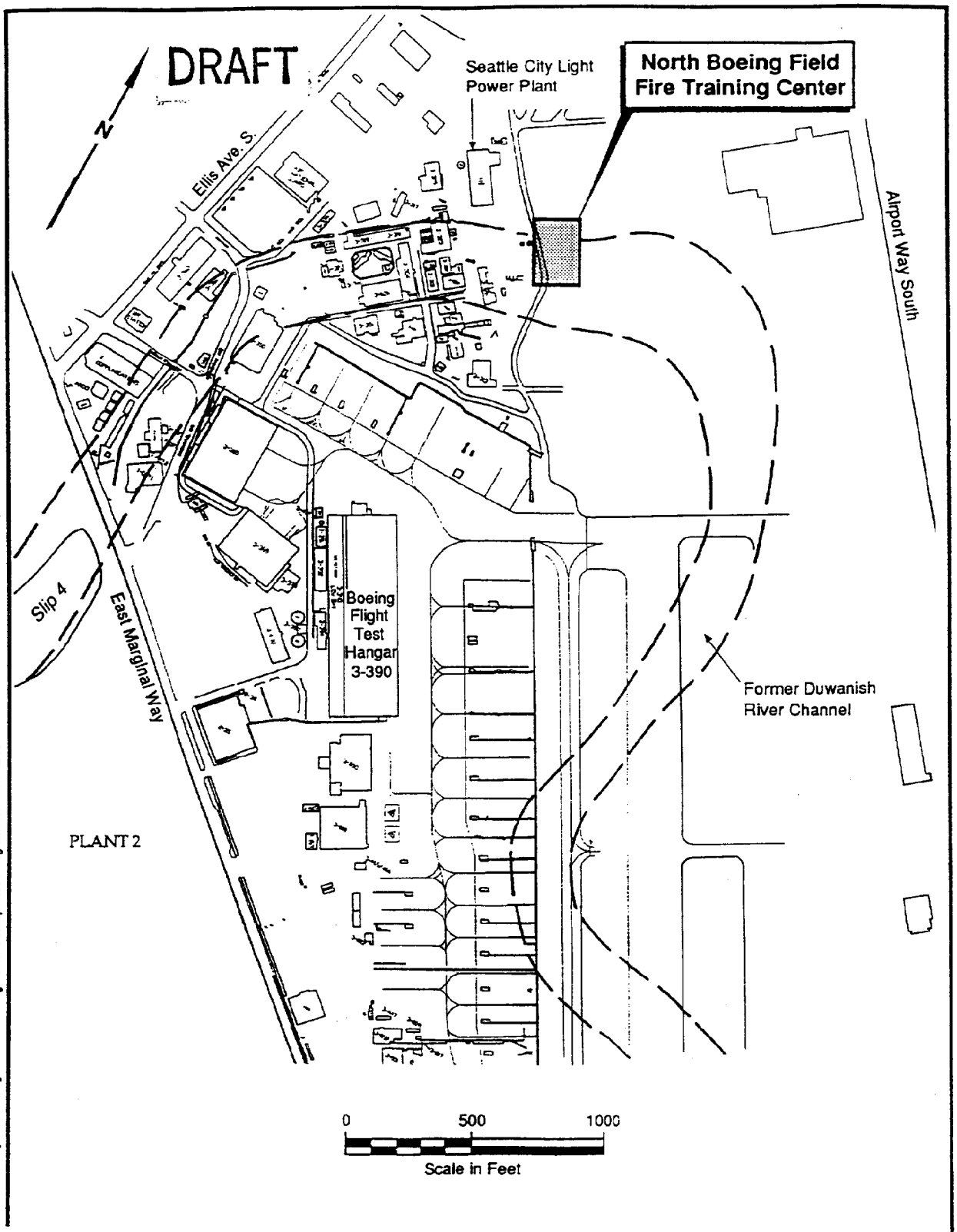
Each Boeing subcontractor is required to prepare and submit to Boeing a health and safety plan covering the subcontractors' respective work on the site. The requirements outlined in this plan are considered the minimum health and safety requirements due to potential site contamination and are intended to be incorporated by each subcontractor into their respective health and safety plan. Each subcontractor may choose to apply more stringent health and safety requirements. This plan does not address physical worker safety issues that may be associated with excavation, trenching and shoring (WAC 296-155, Part N), or work in confined spaces (WAC 296-62, Part M). Relevant federal, state, or local standards should be consulted for such information prior to cleanup action at the site.

1.1 SITE BACKGROUND

Remedial activities will be carried out at the location where fire training activity is known to have occurred, as shown on Figure B-1. Soil and groundwater samples were taken during previous investigations of the site. These data are summarized in Table B-1. The results of the earlier investigations indicate that petroleum hydrocarbons and other chemicals, where present, occurs primarily as constituents in soil.

1.2 PURPOSE, APPLICABILITY, AND ADHERENCE

Cleanup actions at the site will include excavation of soil, collection of soil samples, and possibly dewatering of excavations. These activities will involve disturbance and removal of soil containing TPH and low concentrations of other chemical compounds. The health and safety requirements herein are directed at protecting workers from exposure to organic gases and vapors and potentially impacted soil during these activities. These health and safety requirements apply to all site personnel, including subcontractors or others entering the site.



25068.11 Boeing/North Boeing Field Fire Training Center/Cleanup Action Program Work Plan 12/92

North Boeing Field Training Center
Location Map

Figure B-1

KCSlip4 38199

SEA404729

TABLE B-1
SITE EXPOSURE ASSESSMENT

Chemical Constituent	MAX. CONCENTRATION Sample Location	Soil	Sample Location	Groundwater	Threshold Limit Values Time Weighted Average (mg/m3)	(ppm)	Permissible Exposure Limit Time Weighted Average (mg/m3)	(ppm)	Immediately Dangerous to Life and Health Concentrations	Routes (a)
METALS (soil:mg/kg; gw:mg/L)										
Arsenic	B13	10	MW-4	0.0011	0.2 (c)		0.2		Ca. (100 mg/m3) (b)	Inh,Abs,Ing,Con
Beryllium	B13	1		ND		0.002	0.002		Ca. (10 mg/m3)	Inh
Cadmium	SS-5	0.9		ND	0.05 (d)		0.05 (d)		Ca. (50 mg/m3)	Inh,Ing
Chromium	B6	48.2		ND	0.5 (e)		0.5 (e)			Inh,Ing
Copper	B5	230		ND	1 (f)		1 (f)			Inh,Ing,Con
Lead		150		ND	0.15 (g)		0.15 (h)			Inh,Ing,Con
Mercury	B13	0.2		ND	0.1 (h)		0.01			Inh,Ing,Con
Nickel	B6	52		ND	1 (i)		1 (i)		Ca.	Inh,Ing,Con
Vanadium			MW-3	0.029	0.05 (j)		0.05		70 (mg/m3)	Inh,Ing,Con
Zinc	B13	101			10 (k)		10 (k)			Inh,Con
SEMIVOLATILE ORGANICS (ug/kg)										
Acenaphthene	B7A (3.0-4.0)	69								
Acenaphthylene	B7A (3.0-4.0)	110								
Benzo(a)anthracene	B4 (0.5-1.0)	80								
Benzo(a)pyrene	SS-5	520			0.2 (l)		0.2 (l)		Ca. (700 mg/m3)	Inh, Ing, Con
Benzo(b+k)fluoranthene	SS-5	940								
Benzo(g,h,i)perylene	SS-5	430								
bis(2-ethylhexyl)phthalate	B4 (0.5-1.0)	3900							Ca.	Inh,Ing,Con
Butylbenzylphthalate	B4 (0.5-1.0)	310								
Chrysene	SS-5	350			0.2 (l)		0.2 (l)		Ca. (700 mg/m3)	
Dibenzofuran	B7A (3.0-4.0)	110								
Dimethyl phthalate	B4 (0.5-1.0)	41							9300 (mg/m3)	Inh,Ing,Con
di-n-Butylphthalate	B4 (0.5-1.0)	530			5		5		9300 (mg/m3)	Inh,Ing,Con
di-n-Octylphthalate	B4 (0.5-1.0)	600								
Fluoranthene	SS-5	440								
Fluorene	B4A (8.0-9.0)	200								
Indeno(1,2,3-cd)pyrene	SS-5	500								
2-Methylnaphthalene	SS-5	25000								
4-Methylphenol	B4	980								
Naphthalene	SS-5	14000			52	10	50	10	500	Inh,Abs,Ing
Phenanthrene	B7A (3.0-4.0)	280			0.2 (l)		0.2 (l)		Ca. (700 mg/m3)	
Phenol	B4 (0.5-1.0)	280			19	5	19	5	250	Inh,Abs,Ing,Con
Pyrene	SS-5	580			0.2 (l)		0.2 (l)		Ca. (700 mg/m3)	Inh, Ing, Con
VOLATILE ORGANICS (ug/kg)										
Bromodichloromethane	B7A (3.0-4.0)	350								
Bromoform	B7A (3.0-4.0)	290			5.2	0.5	5	0.5		
2-Butanone	B11 (7.0-7.5)	990			590	200	590	200	3000	Inh,Ing,Con
Carbon tetrachloride	B7A (3.0-4.0)	330			31	5	12.6	2	Ca. (300 ppm)	Inh,Abs,Ing,Con
1,1-Dichloroethane	B7A (3.0-4.0)	380			405	200	400	200	4000	Inh,Ing,Con
1,2-Dichloropropane	B7A (3.0-4.0)	350			347	75	350	75		
Methylene chloride	B11 (7.0-7.5)	1800			174	50		100	Ca. (5000 ppm)	Inh,Ing,Con
Toluene	B7A (10.0-10.5)	28			188	50	375	100	2000	Inh,Abs,Ing,Con
1,1,1-Trichloroethane	B7A (3.0-4.0)	330			1910	350	1900	350		
1,1,2-Trichloroethane	B7A (3.0-4.0)	340			55	10	45	10	Ca. (500 ppm)	Inh,Abs,Ing,Con
Xylenes (total)	SS-5	21000								

TABLE B-1
SITE EXPOSURE ASSESSMENT

Chemical Constituent	MAX. CONCENTRATION Sample Location	Soil	Sample Location	Groundwater	Threshold Limit Values Time Weighted Average (mg/m3)	(ppm)	Permissible Exposure Limit Time Weighted Average (mg/m3)	(ppm)	Immediately Dangerous to Life and Health Concentrations	Routes (a)
PETROLEUM HYDROCARBONS (mg/kg)										
TPH (gas range)	B3 (0.0-1.0)	15								
TPH (diesel range)	SS-5	25000								
OTHER ORGANICS										
PCBs (mg/kg)	B4 (0.5-1.0)	2.7		ND	0.5 (m)		0.5 (m)		Ca. (5 mg/m3)	Inh, Ing, Con
VOCs				ND						
SVOCs				ND						
Skydrol (soil:mg/kg; gw:ug/L)	B11 (5.5-6.0)	150000	MW-4	30						

ND = Not detected.
(a) Ing: Ingestion
Inh: Inhalation
Abs: Absorption
Con: Dermal Contact
(b) Ca.= NIOSH designated potentail carcinogen. No IDLH value.
(c) As soluble compounds.
(d) As dust and salts.
(e) As Chromium (III).
(f) As mists and dusts.
(g) As metal dust and fumes.
(h) As inorganic compounds.
(i) As metals and insoluble compounds.
(j) As vanadium pentoxide.
(k) As total dust.
(l) Criteria for toal coal tar pitch volatiles (benzene-soluble fraction).
(m) Aroclor 1254

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All individuals working onsite must read the Health and Safety Plan prior to participation in field work. If any information presented in this plan is unclear, the reader must contact the Boeing Project Manager, Boeing Field Coordinator, or Landau Associates Site Safety Officer for clarification prior to participating in any field activity. Once the information has been read and understood, the individual must sign the Health and Safety Acknowledgement Form (Figure B-2); this executed form will be kept in the job file. After each individual has read the Health and Safety Plan, but before participating in field activities, a training session will be conducted to familiarize personnel with health and safety requirements at the site (see Section 8.0 of this Plan).

This Health and Safety Plan has been designed to be flexible, in order to allow unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. These requirements may be modified at any time by the Boeing Project Manager. Any modification will be presented to the onsite team during a safety briefing and documented using the Health and Safety Plan Modification Form (Figure B-3).

1.3 PROJECT ORGANIZATION AND RESPONSIBILITIES

1.3.1 Boeing Project Manager

The Boeing Project Manager for this phase of the project is Mr. Brian D. Anderson. He has responsibility over all project planning and execution. He will be responsible for making project-level decisions regarding safety rules and operations in consultation with the Landau Associates Site Safety Officer. The Boeing Project Manager may close down the project if health and safety issues warrant. Specific responsibilities of the Boeing Project Manager include:

- Monitoring the subcontractors for compliance with their site health and safety plans
- Conducting orientation training with the assistance of the Landau Associates Site Safety Officer for all personnel prior to beginning their activities
- Determining minimum personal protection levels and necessary clothing and equipment
- Seeing that all monitoring equipment is calibrated on a daily basis, is operating correctly, and that the results are recorded properly.

FIGURE B-2

HEALTH AND SAFETY ACKNOWLEDGEMENT FORM

I have read and understand the Health and Safety Plan for the North Boeing Field Fire Training Center Investigation at the King County Airport and have discussed any questions which I have regarding site contaminants with my supervisor and the designated Site Safety Officer. I agree to follow the requirements of the Plan.

Firm _____

Employee _____ Date _____

Supervisor _____ Date _____

DRAFT

FIGURE B-3

HEALTH AND SAFETY PLAN MODIFICATION FORM

NORTH BOEING FIELD FIRE TRAINING CENTER CLEANUP ACTION

KING COUNTY AIRPORT

DATE ___/___/___

Modification: _____

_____

_____

_____

Reasons for Modification: _____

_____

_____

_____

Site Personnel Briefed:

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Approvals

Designated Site Safety Officer: _____

Boeing/NBF Project Manager: _____

Others: _____

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1.3.2 Boeing Field Coordinator

A Boeing Field Coordinator will be assigned to this project who will be responsible for day-to-day activities at the site. He/she will notify the Site Safety Officer and Site Safety Representative(s) of conditions which come to the attention of Boeing during the course of the project, which would require modifications to the health and safety plan(s). The Boeing Field Coordinator's responsibilities include, but are not limited to, the following:

- Review and approval of the Health and Safety Plan with concurrence from the Boeing Project Manager
- Suggesting modifications to the Health and Safety Plan, as appropriate, with concurrence from the Landau Associates' Site Safety Officer and Boeing Project Manager
- Perform field monitoring, as appropriate
- Maintain project files for Boeing including:
  - Health and Safety Acknowledgement Form (Figure B-2)
  - Health and Safety Plan Modification Form (Figure B-3)
  - Training Form (Figure B-4)
  - Employee Exposure/Injury Incident Report Form (Figure B-8, see Page B-24)
  - Records of all daily monitoring results.

1.3.3 Site Safety Officer and Representative(s)

Boeing shall have a designated Site Safety Officer onsite during all intrusive activities. The Site Safety Officer could be the Boeing Project Manager, the Boeing Field Coordinator, or another qualified individual. Each subcontractor shall also assign a site safety representative for this project. He/she will be responsible for the implementation of their health and safety plan. The Site Safety Officer and representative(s) shall:

- Establish that personnel are aware of health and safety requirements and the potential hazards associated with the work, are instructed in safe work practices, and understand the planned procedures for dealing with emergencies
- Provide that all required forms are completed and that originals of those forms are provided to the Boeing Field Coordinator
- Correct any work practices or conditions that may result in injury to personnel or exposure to hazardous substances

DRAFT

FIGURE B-4

TRAINING FORM

Employee Name: _____

Address: _____

Phone: _____

Company: _____

Training:

List all successfully completed Health and Safety Training

Date	Location	Trainer	Hours	Title/Subject Matter

I certify that I have successfully completed the training programs listed above.

_____
Signature

_____
Date

- Require that appropriate personal protective equipment is properly used by all onsite personnel
- Report any deviations for the anticipated conditions described in this document to the Boeing Project Manager.

2.0 SITE DESCRIPTION, ORGANIZATION, AND OPERATION

2.1 SITE DEFINITION

The site is defined by the approximate limits of the NBF FTC as well as any incidental areas where site-related activities occur. Figure B-1 shows the areas of primary concern in relation to the North Boeing Field facility.

2.2 SITE ORGANIZATION AND OPERATION

The site layout will consist of Exclusion Zones and Contamination Reduction Zones. Site zones boundaries may require modification during onsite activities. The exclusion zones encompass the area where intrusive work is occurring. The exclusion zones will be maintained as such only during periods when intrusive activities such as excavating are being conducted.

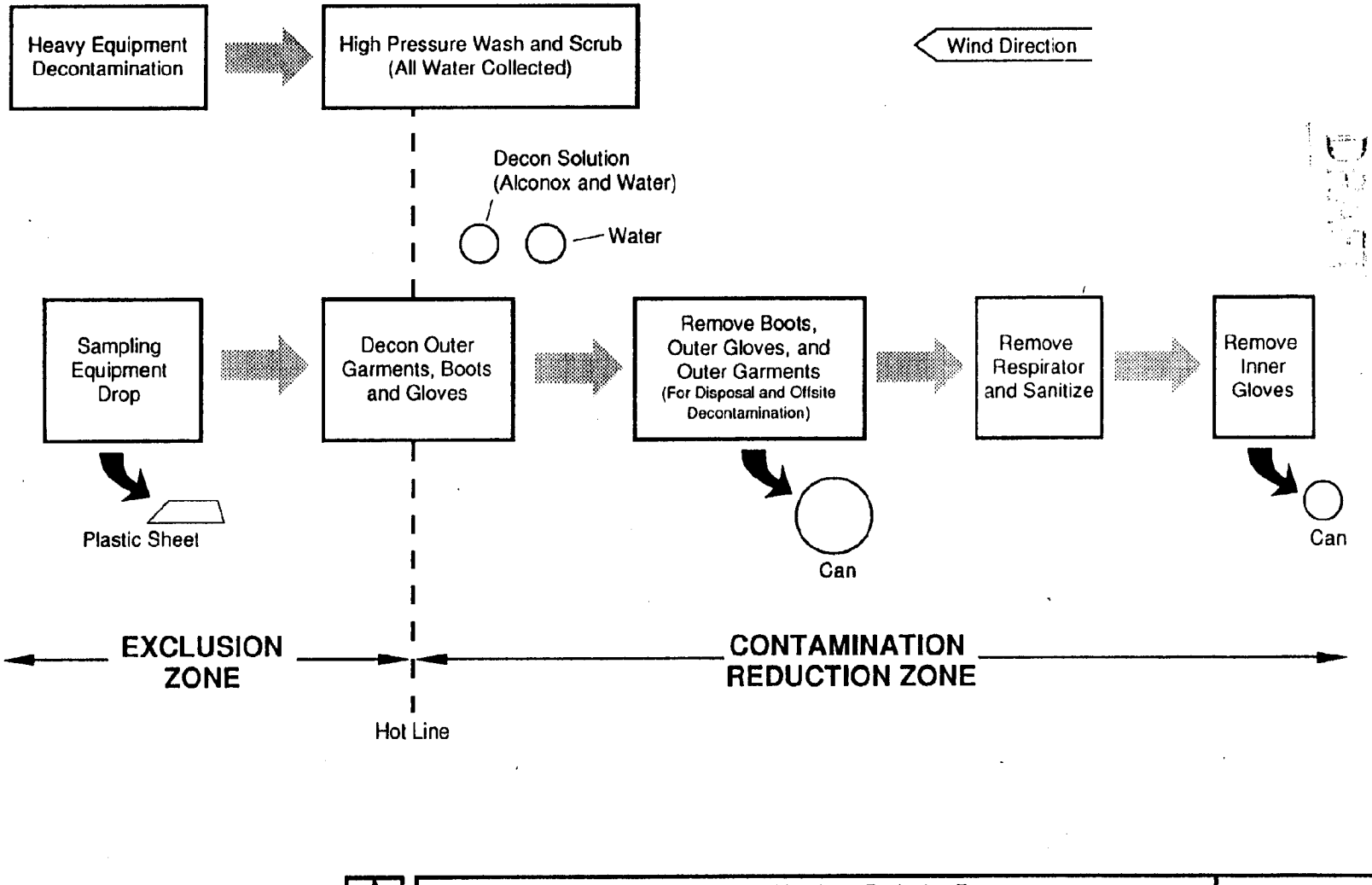
2.2.1 Contamination Reduction Zones

Only those persons having read this or an equivalent subcontractor Health and Safety Plan and who have signed the Health and Safety Acknowledgement Form (Figure B-2) will be allowed in the Exclusion Zones. The level of protection required in the Exclusion Zones will depend on the activities being conducted, and may be adjusted as conditions change. All visitors will be restricted to the support zones. The required levels of protection are discussed in Sections 4.0 and 5.0 of this Health and Safety Plan.

2.2.2 Contamination Reduction Zones

The contamination reduction zones will be established for both personnel and equipment decontamination. These areas will be used to limit the transfer of potentially impacted soil. A recommended layout for the transition from the Exclusion Zones to the Contamination Reduction Zones will be determined by the designated Site Safety Officer. An example of the type of layout that may be used is shown on Figure B-5.

All personnel will suit-up in personal protective equipment consistent with the Health and Safety Plan while in the Contamination Reduction Zones, or other designated area before



Schematic of Transition from Exclusion Zone to Contamination Reduction Zone

Figure B-5

entering the Exclusion Zones. All personnel and equipment will leave the exclusion zones through the Contamination Reduction Zones and adhere to decontamination procedures as specified in Section 3.4.1 of this Plan.

2.2.3 Site Security

Site security will be the responsibility of the Boeing Project Manager (or designee). Access to the contamination reduction zones for all personnel involved in this work may be controlled through the use of flagging, reflective tape, or barricades. The exclusion zones will also be identified using warning tape, flagging, or barricades.

3.0 SAFETY PROCEDURES

Safety must be the concern of every individual involved in project activities. Whether in the office or onsite, properly followed procedures are essential for personal safety and to minimize lost time due to injuries or accidents involving equipment. Potential hazards while working at the site include, but are not limited to:

- Exposure to toxic and/or hazardous chemicals
- Physical hazards from heavy equipment
- Fire or explosion caused by flammable or combustible materials
- Heat stress caused by personal protective equipment and/or weather
- Aircraft traffic associated with the King County Airport.

3.1 CHEMICAL HAZARDS

Organic compounds and metals are potentially present within soil at the site. The presence of such compounds, some of which are known or suspected human carcinogens, may require the special considerations outlined within these health and safety requirements and each subcontractor's health and safety plan. Section 4.0 of this Plan identifies the specific compounds of concern and action levels for which personal protection against such chemical hazards must be taken.

3.2 PHYSICAL HAZARDS

Field work near heavy equipment operations poses physical hazards. Workers will need to be aware of all heavy equipment activity and be ready to avoid moving vehicles. Mobile construction equipment shall be equipped with backup alarms and all workers will be made aware of their use. Only operators of heavy equipment will be allowed to ride on the

equipment. Relevant federal, state, and local laws/regulations governing construction must be followed.

3.3 GENERAL SAFETY REQUIREMENTS

Project personnel have the responsibility for:

1. Taking all reasonable precautions to prevent injury to themselves and others
2. Performing only those tasks that they believe they can do safely, and immediately reporting the presence of unsafe conditions
3. Implementing the health and safety requirements, and reporting any deviation from the procedures to the Boeing Field Coordinator or designated Site Safety Officer
4. Notifying the Boeing Field Coordinator or designated Site Safety Officer of any special medical problems and ensuring that all appropriate onsite personnel are aware of any such problems.

The following general safety rules apply:

1. Workers will enter the exclusion zones from the upward side of the site unless it becomes impractical.
2. Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. The use of any prescription drug shall be reported to the Boeing Field Coordinator.
3. Long hair must be contained inside a hard hat. Individuals required to wear respirators shall not have beards.
4. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited inside the designated Exclusion Zones or Contamination Reduction Zones. Washing hands, forearms, and face are required before taking meals.
5. Unapproved work clothes will not be allowed within the Exclusion Zones or the Contamination Reduction Zones.
6. Exchange of personal protective equipment will not be allowed.
7. Climbing or standing on machinery or equipment is prohibited unless authorized by the Boeing Field Coordinator.

3.4 SITE EXIT DECONTAMINATION

All personnel and equipment must be properly decontaminated before leaving the Contamination Reduction Zones. All personnel and equipment that have entered the Exclusion Zones will leave only through the Contamination Reduction Zones.

3.4.1 Routine Decontamination Procedures

All personnel and equipment will undergo appropriate decontamination procedures prior to leaving the site. A decontamination area will be set up in the Contamination Reduction Zones shown on Figure B-5. Before commencing work on the site, all personnel will be trained by the designated Site Safety Officer in site-specific decontamination procedures. Personal decontamination will be as follows:

Step 1: Wash and rinse non-disposable protective clothing.

Step 2: Remove disposable clothing. Place in marked receptacle.

Step 3: Remove, wash, rinse, and sanitize respirator (if used).

Step 4: Exit the Contamination Reduction Zones.

Step 5: Wash hands and face.

3.4.2 Emergency Decontamination

In case of an emergency, gross decontamination procedures will be speedily implemented if possible. If a life-threatening injury occurs and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he/she will be transported wrapped in plastic sheeting. The medical facility will be: 1) informed that the injured person has not been decontaminated and 2) given information regarding the most probable contaminants.

3.4.3 Personal Protective Equipment Decontamination

Certain parts of respirators such as the harness assembly or cloth components are difficult to decontaminate. If these components cannot be decontaminated, they will be discarded. Rubber components will be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing in a detergent solution followed by a clear rinse, then hung to dry.

Each person will be responsible for decontaminating his/her own respirator and will be trained in respirator maintenance as part of the health and safety training program.

3.4.4 Heavy Equipment Decontamination

All heavy equipment must be thoroughly decontaminated prior to leaving the site. Particular care will be taken in decontaminating those parts of heavy equipment that have come into direct contact with soil, such as tracks, tires, shovels, grapples, and scoops.

For wet decontamination procedures, high-pressure water will be used (hot water if necessary). Physical scrubbing with disposable brushes will be used when necessary to loosen materials.

3.5 DISPOSAL OF IMPACTED FLUIDS AND MATERIALS

All equipment and materials used for decontamination or personal protection will be cleaned or collected for appropriate disposal. All non-disposable clothing and equipment will be decontaminated onsite. Disposables will be containerized. Liquids will be collected in storage tanks or drums and disposed of as required based on sampling and analysis.

3.6 HOUSEKEEPING

Work areas will be kept clean and orderly at all times. Ordinary refuse will be placed in suitable rubbish bins or trash containers. Extraneous materials will be minimized within the Exclusion Zones to reduce the decontamination load and possibilities for cross-contamination.

3.7 VISITORS

All visitors must be cleared by the Boeing Project Manager, Boeing Field Coordinator, or designee. Visitors will only be allowed to observe operations, and must obey all instructions of the Boeing Field Coordinator.

3.8 SPECIAL HAZARDS/SAFETY

Large aircraft takeoff and landing at North Boeing Field may present a noise hazard to site personnel. All site personnel will be equipped with hearing protection which is compatible with other personal safety equipment which may be required. This hearing protection will be donned when it is evident that aircraft noise is imminent and any work which may present potential safety hazards because of use of hearing protection will be discontinued until hearing protection can be removed.

4.1 BASIS FOR ANALYSIS

Previous investigations have tentatively identified certain constituents of concern at the site. However, present information is not complete enough to accurately determine risk levels. Exposure limits specified by the Washington State Department of Labor and Industries (Permissible Exposure Limits) and those specified by the American Council of Governmental Industrial Hygienists (Threshold Limit Values) are summarized in Table B-1. The lower of the two values will be used as the reference exposure limit. Documents identified Section 10.0 were used in assessing site hazards/risks.

4.2 HAZARD ANALYSIS

The degree of overall hazard depends on the activity being performed, the compounds encountered, and the quantity of dust and/or vapors generated during construction activities. Specific hazards are discussed below.

4.2.1 Fire/Explosion

Although some of the chemical compounds which were probably handled at the site can be explosive or flammable, they are typically found in relatively low concentrations, making the risk of fire or explosive conditions unlikely.

4.3 ACTION LEVELS FOR REQUIRED PROTECTION

Table B-1 lists exposure limits that will trigger upgrading personal protective equipment requirements. The exposure limits listed assume sustained readings of one minute or more in the breathing zones. The personal protective equipment requirement applies to the area within a 30-foot radius of where measured. Justification for the exposure limits is presented in Section 4.4.

It is anticipated that most of the project site activities will be performed at Level D (modified), supplemented with air purifying respirators if the action levels identified for Level C in Section 4.4.1 are reached. Nuisance solvent odors which do not present a potential health hazard may be evident during aircraft takeoff and landing at North Boeing Field. The air purifying respirators may be used at the discretion of site personnel for comfort in these circumstances.

4.4 JUSTIFICATION FOR EXPOSURE LIMITS

4.4.1 Level D to Level C Action Levels

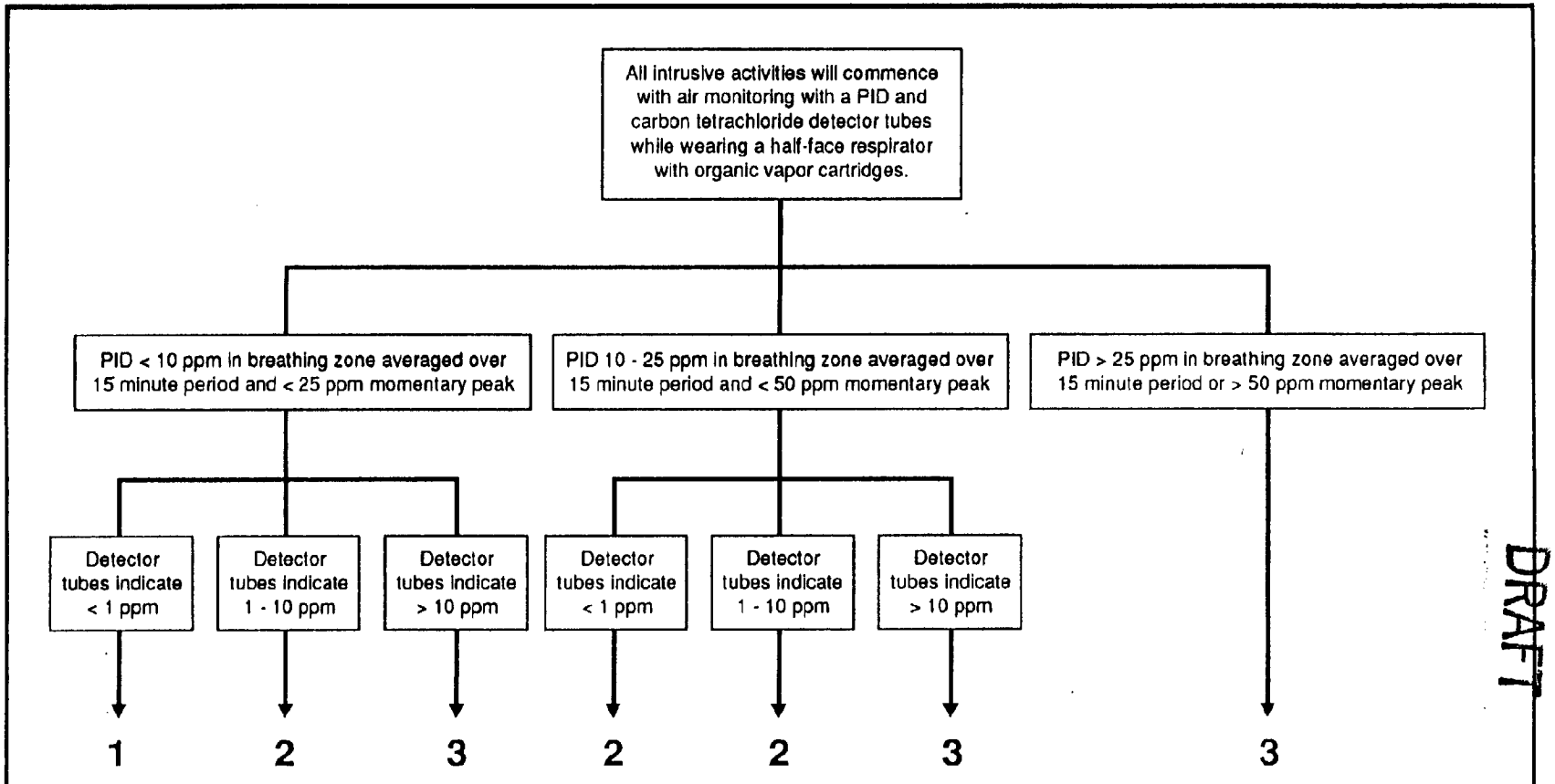
Carbon tetrachloride is the constituent which may be present onsite which has the lowest Permissible Exposure Limit (PEL) of all constituents detected in soil (2.0 ppm). Carbon tetrachloride cannot be detected using a photoionization detector (PID) with a 1.0 ev lamp. Therefore, monitoring will also be conducted at the initiation of intrusive activity with detector tubes and hand pump for the purpose of monitoring specifically for carbon tetrachloride. If no carbon tetrachloride is present, higher action levels for donning respiratory protection have been established based on the PID, which is more responsive to other volatile constituents onsite, as indicated by Figure B-6.

4.4.2 Level C Action Levels

A full-face respirator, equipped with organic vapor and high efficiency particulate cartridges, provides a protection factor of 100, and a half-face respirator provides a protection factor of 10. Thus, a full-face respirator may be worn in concentrations up to 100 times the TLV values noted in Table B-1, and a half-face respirator in concentrations up to 10 times these values.

Based on the previous investigations, it is not expected that Level C action levels will be exceeded. However, if they are, half-face respirators will be worn (assuming the concentration of the airborne constituents is less than 10 times the exposure limits). Half-face respirators are preferred to full-face because of their less restrictive nature and decreased visual impairment. Visual impairment is of concern because of potential worker exposure to heavy equipment injury. However, if levels do exceed 10 times the exposure limits, full-face respirators will be required.

Field conditions are not expected to exceed the 100 protection factor level, such that Level B protection would be required. If conditions are encountered that warrant Level B protection, safety procedures will be revised prior to commencing or continuing activities.



1 = LEVEL D and continued monitoring

2 = LEVEL C (half-face respirator with organic vapor cartridges) and continued monitoring

3 = LEVEL B (refer to text of Health and Safety Plan)

Action Levels for Respiratory Protection During Intrusive Activity at the North Boeing Field Fire Training Center

Figure B-6

5.0 PERSONAL SAFETY EQUIPMENT

5.1 REQUIRED EQUIPMENT

Equipment required for the various levels of protection expected onsite are listed below:

Level D (Modified):

- Tyvek or coveralls (Saranex or equivalent water resistent coveralls or rain gear when direct contact with wet soil is expected)
- Heavy duty nitrile or neoprene outer gloves
- Vinyl or latex inner gloves
- Hard hat
- Safety glasses
- Steel-toe and steel-shank neoprene or rubber boots
- Hearing protection (ear muffs or plugs) that is compatible with use of other required personal safety equipment.

Workers in the exclusion zones will have their Tyvek (or equivalent) taped to the gloves at the wrist and to the boots at the ankles when in contact with wet soil.

Level C (Modified):

- Level D (modified) equipment
- Half- or full-face air-purifying respirator equipped with high efficiency air purifying OVAG/particulate cartridges. Respirators must be MSHA/NIOSH approved. Cartridges will be changed daily (if used) or more frequently if directed by the designated Site Safety Officer.

6.0 AIR MONITORING

Air monitoring will be performed by the designated Site Safety Officer to determine necessary levels of respiratory protection (based on action level given in Sections 4.4.1, 4.4.2, and on Figure B-6). Background readings will be taken upwind of site activities. Monitoring for organic vapors shall be accomplished using a photoionization detector, which is a portable instrument that measures the concentration of ionizable compounds in air, and with a hand pump and carbon tetrachloride detector tubes, as indicated on Figure B-6.

Monitoring for aerosols is not expected to be necessary because particulate generation should be minimal. However, if particulates (dust) are generated in the exclusion zones, then

a hand-held aerosol monitor and radiation detector shall be used to monitor particulate levels and an appropriate PEL set by the designated Site Safety Officer.

7.0 EMERGENCY RESPONSE

Emergency Facilities and Numbers

Hospital: Harborview Medical Center
325 9th Avenue
Seattle, WA

Information: 223-3036 Emergency: 223-3074

Directions:

Take Ellis Avenue north to Warsaw Street, turn left; take Warsaw to Carleton and turn right; take Carleton east to the I-5 entrance and get on I-5 northbound; take I-5 to the Madison Street exit, take right onto Madison, go four blocks to Boren and turn right, go six blocks to Terrace Street, and follow signs to Harborview emergency room entrance.

Other Emergency Telephone:

Site Fire Department -
Site Security -

Emergency Transportation Systems (fire, police, ambulance): 911

Emergency Route

See Figure B-7

Emergency Contacts

Emergency/Fire - 911
Hospital - 223-3074
Brian Anderson (Boeing Project Manager) - Office 447-2184
Site Fire Department - 655-2222
Bill Evans (Landau Associates Project Manager) - Office 778-0907
Julie Wilson (Landau Associates Site Safety Officer) - Office 778-0907

In the event of an emergency, do the following:

1. Call 911 for help as soon as possible. Give the following information:

   - **WHERE** the emergency is - use cross streets or landmarks
   - **PHONE NUMBER** you are calling from
   - **WHAT HAPPENED** - type of injury
   - **HOW MANY** persons need help
   - **WHAT** is being done for the victim(s)
   - **YOU HANG UP LAST** - let the person you called hang up first

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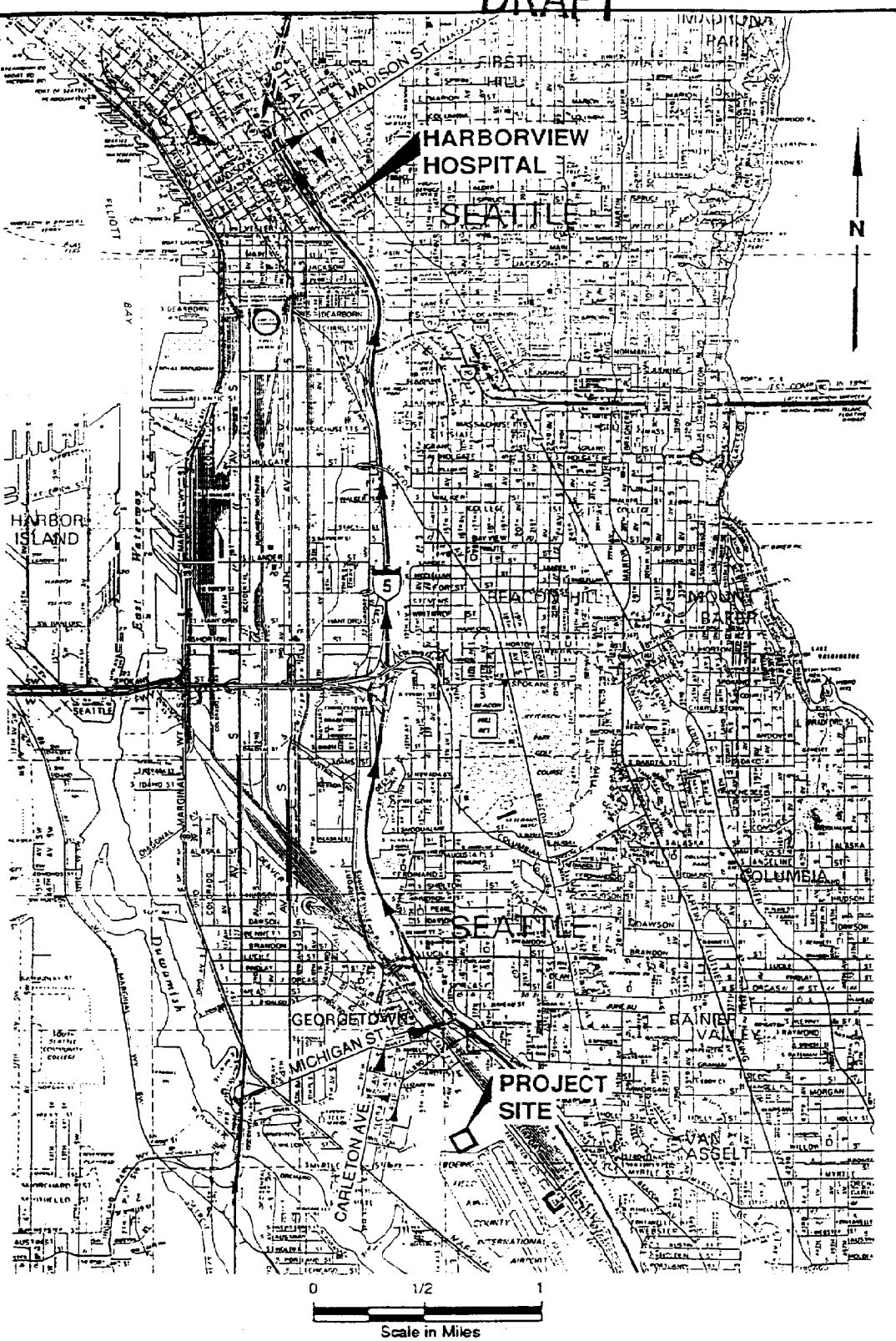

25068.11 Boeing/North Boeing Field Fire Training Center/Cleanup Action Program Work Plan 12/02

Emergency Route to Hospital

Figure B-7

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2. Transport to the hospital will be performed by local emergency response professionals in all cases except minor injuries requiring non-emergency treatment. If the injury or exposure is not life threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.
3. Make appropriate site contact(s), call Boeing Project Manager.

7.1 ONSITE EMERGENCY EQUIPMENT

An Industrial First Aid Kit, a 20-pound type ABC portable fire extinguisher, and an eyewash kit will be maintained at the site.

7.2 OFFSITE EMERGENCY SERVICES

A copy of the EMERGENCY FACILITIES AND NUMBERS will be posted next to the telephone identified for emergency use.

7.3 NON-LIFE THREATENING EMERGENCIES

7.3.1 Injuries

In emergency situations which are not life-threatening (e.g., a broken leg), some decontamination procedures may be modified according to the specific circumstances. Outer protective clothing should be removed if doing so would not cause delays or aggravate the injury. Respirators should only be removed: 1) if the victim has stopped breathing, or 2) after the victim has been removed from a breathing hazard area. Normal decontamination procedures should be followed when possible.

Bodily injuries which occur as a result of an accident during operations at the site will be handled in the following manner:

- The victim will be administered to by an individual who holds current first-aid and/or CPR certifications utilizing the emergency equipment onsite.
- The local first-aid squad/rescue unit, a local hospital, and the Boeing Project Manager will be notified depending on the nature of the emergency.

7.3.2 Heat-related Illnesses

Heat-related illnesses can occur at any time when protective clothing is worn. Workers wearing semi-permeable or impermeable encapsulating clothing should be monitored when the temperature in the work area is above 70°F (21°C). Heat stress monitoring includes regular checks of heart rate. The designated Site Safety Officer shall be trained in monitoring, treating,

and recognizing the signs of heat stress. Unless the victim is obviously contaminated, decontamination should be minimized and treatment begun immediately.

7.3.3 Flu-Like Symptoms

No personnel with flu-like symptoms will be allowed to work in the exclusion zones. Any site personnel developing flu-like symptoms while at work will be sufficient cause for ceasing operations until the work area is evaluated and a "return to operations" is cleared by the designated Site Safety Officer.

7.4 FIRE

A fire extinguisher (ABC) will be kept onsite during construction activities. This equipment will be used only to respond to minor fires. In the event of major fires, explosions, or fire/explosion hazard conditions, all personnel will immediately sound the appropriate alarm to others on the site and evacuate to the Contamination Reduction Zones. The designated Site Safety Officer will evaluate the need for further evacuation and/or emergency services.

7.5 SITE EVALUATION AND EVACUATION

The designated Site Safety Officer will be responsible for determining if circumstances exist which require re-evaluation and/or evacuation.

7.5.1 Stages of Evacuation

Two levels of evacuation have been considered:

- Withdrawal from the immediate work area onsite
- Evacuation of the surrounding area.

7.5.1.1 Withdraw From Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- Detection of volatile organics and/or toxic gases at concentrations above action levels for the level of protection being worn (see Sections 4.3 and 4.4)
- Occurrence of a minor accident - field operations will resume after first-aid and decontamination procedures have been administered
- Malfunction or failure of protective equipment, clothing, or respirator.

7.5.1.2 Evacuation of Surrounding Area

There are no foreseeable conditions based on current knowledge at the site that would require evacuation of the surrounding area. The Boeing Field Coordinator will be responsible for determining if circumstances exist for area-wide evacuation after consultation with the designated Site Safety Officer, and should always assume worst case conditions until proven otherwise. Fire and police departments must be contacted. A list of emergency response individuals familiar with site work, including addresses and telephone numbers, will be located at the site, and will be carried by both the designated Site Safety Officer and the Boeing Field Coordinator. If evacuation is necessary, it will be implemented with the assistance of these emergency response personnel.

7.6 ACCIDENT/INCIDENT REPORTING PROCEDURES

Procedures for reporting accidents/incidents are listed below. They will be performed in the order indicated.

1. Call appropriate emergency services numbers (ambulance, fire, etc.). Provide information listed below.
2. Call the Boeing Project Manager and provide information listed below.
3. A Site Safety Officer will complete a written accident/incident report (Figure B-8) within 24 hours, sending copies to the Boeing Project Manager.

Give the following information when reporting an emergency:

1. Name and location of person reporting
2. Location of accident/incident
3. Name and affiliation of injured party
4. Description of injuries
5. Status of medical aid effort
6. Details of any chemicals involved
7. Summary of the accident, including the suspected cause and the time it occurred.
8. Temporary control measures taken to minimize further risk.

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FIGURE B-8
EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT FORM
(Use additional page if necessary)

Date: _____ Time: _____

Name: _____ Employer: _____

Site Name and Location: _____

Site Weather (clear, rain, snow, etc.): _____

_____

Nature of Illness/Injury: _____

_____

Symptoms: _____

Action Taken: Rest _____ First Aid _____ Medical _____

Transported by: _____

Witnessed by: _____

Hospital's Name: _____

Treatment: _____

Comments: _____

_____

What was the person doing at the time of the accident/incident? _____

_____

Personal Protective Equipment Worn: _____

_____

Cause of Accident/Incident: _____

_____

_____

What immediate action was taken to prevent recurrence? _____

_____

_____

Additional comments:

Employee's Signature:

_____
Date

Supervisor's Signature:

_____
Date

Site Safety Officer's Signature

_____
Date

This information is not to be released under any circumstances to parties other than those listed in this section and bona fide emergency response team members.

8.0 TRAINING

Orientation training will be held prior to beginning work onsite. If appropriate, based on site observation and air monitoring results, the Boeing Project Manager or the Site Safety Officer may require site personnel to have additional safety training. The initial training will be supplemented, as necessary, in subsequent safety meetings. Orientation training will include:

- Health effects and hazards of the chemicals identified or suspected to be at the site
- Personal protection requirements
- Personal hygiene (beards, etc.)
- Use, care, maintenance, and fitting of personal protective equipment including fit-testing of air purifying respirators. Training in respiratory equipment use will conform to ANSI Z818.2 (1980) and 29 CFR 1910.134, which establishes the necessity, effectiveness, and limitations of respiratory equipment. Workers with limiting physical disabilities such as respiratory ailments shall not be assigned to tasks requiring the use of respirators
- Decontamination procedures
- Accepted practices for entry, exit, and activities with specific area of the site, including prohibition of food consumption and smoking within the Exclusion Zones and the Contamination Reduction Zones
- Emergency response procedures as specified in Section 7.0 of this Health and Safety Plan.
- Review and assessment of equipment

Written documentation of onsite training will be maintained by the Boeing Field Coordinator and the Site Safety Officer.

9.0 MEDICAL MONITORING

A baseline medical evaluation will be required for all employees, subcontractors, and subcontractors working onsite in the Exclusion Zones or Contamination Reduction Zones. The medical surveillance program will be in compliance with 29 CFR 1910.120. All personnel working in these areas must be determined to be physically qualified to wear respiratory protection by a physician.

10.0 BIBLIOGRAPHY

American Conference of Governmental Industrial Hygienists. 1992. Threshold Limit Values and Biological Exposure Indices for 1992-1993.

CH2M Hill Northwest. 1987. Soil and Ground Water Investigation, North Boeing Field Fire Training Center. December.

Landau Associates, Inc. 1992. Soil and Groundwater Investigation, Fire Training Center—North Boeing Field, King County Airport, Seattle, WA. October 26.

Laucks Testing Laboratories, Inc. 1984. Sediment Sampling and Testing Reports. May.

Shannon & Wilson. 1983. Subsurface Investigation of Petroleum Product Occurrence, North Boeing Field, Fire Practice Pit. July 12.

U.S. Department of Health and Human Services, Public Health Service; Centers for Disease Control, National Institute for Occupational Safety and Health. 1990. NIOSH Pocket Guide to Chemical Hazards, June.

U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health. 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October.

U.S. Department of Labor, Occupational Safety and Health Administration. 1989. Federal Register: 29 CFR Part 1910, Hazardous Waste Operations and Emergency Response; Final Rule, March 6.

U.S. Environmental Protection Agency, Environmental Response Branch, Hazardous Response Support Division. 1984. Standard Operating Safety Guide, November.

Washington State Department of Labor and Industries, Division of Industrial Safety and Health. General Safety and Health Standards (296-24 WAC), General Occupational Health Standards 1989 (296-62 WAC), May, and Safety Standards for Construction Work 1989 (296-155 WAC), May.